Consolidated Program for Research and Development for Welding of High Strength Steel Pipelines, #277 & 278

PUBLIC PAGE

14th QUARTERLY REPORT
Project WP#277: Update of Weld Design, Testing, and Assessment Procedures for High Strength Pipelines

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Prepared By: Yong-Yi Wang, Ph.D.
Principal Investigator
Center for Reliable Energy Systems (CRES)
5960 Venture Dr., Suite B
Dublin, OH 43017
614-808-4872
ywang@CRES-americas.com

Mr. Ian Wood
Team Project Manager
Electricore, Inc.
27943 Smyth Drive, Suite 105
Valencia, CA 91355
ian@electricore.org

Ken Lorang
Team Project Manager and Technical Coordinator
Pipeline Research Council, International
3141 Fair View Park Drive, Ste 525
Falls Church, VA 22042
klorang@prci.org

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Background

High strength pipelines are expected to become a major player in long distance onshore hydrocarbon transportation. Understanding the differences between the modern high strength and older-generation linepipes is critical to the safe and economical application of those modern materials. The objectives of this project to fill the critical gaps and provide guidelines on the effective use of high strength linepipes, from design and testing to weld integrity assessment procedures. The interdependence of linepipe materials, welding processes, design requirements, and weld integrity are being investigated to enable realistic and effective use of high strength linepipes.

Progress in the Quarter

The teams from CRES, CANMET, LEC, and NIST continued to generate the experimental test data, compilation and analysis of the experimental data, and formulation of final report structures. The team also developed mechanical test matrix for the third round of welds in conjunction with Project 278. The major activities included the following:

1. The draft recommended practice prepared by CANMET outlining procedures to machine AWM strip tensile specimens was successfully used and evaluated by LECO researchers to assess 5G single torch field welds prepared for Task 4 in Project 278. CANMET and LECO are working in collaboration to further update the AWM tensile testing protocol that was developed to evaluate narrow gap pipeline girth welds.
2. CANMET researchers have prepared a series of topical reports on their work on the development and application of low-constraint toughness testing of girth welds produced in this program. They have also submitted a draft conference paper to PVP 2011.
3. NIST researchers completed more curved wide plate (CWP) tests for different flaw sizes and test temperatures.
4. CRES conducted post-test analysis of CWP data, including calculation of unloading compliance.
5. CRES developed compliance functions for CWP specimens.
6. CRES computed flaw growth from unloading compliance and the compliance functions.
7. NIST developed fatigue pre-cracking procedures for the third round of welds which has different pipe diameter and wall thickness. NIST has also developed the post-test fractography methods to determine initial and final dimensions of the tested flaw.
8. CANMET delivered materials to multiple laboratories for the round-robin tests of SE(T) specimens.